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FISH & RICHARDSON PC 225 FRANKLIN ST BOSTON, MA 02110			AMARI, ALESSANDRO V	
			ART UNIT	PAPER NUMBER
			2872	

DATE MAILED: 03/22/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/727,103

Applicant(s)

CADO ET AL.

Examiner

Alessandro V. Amari

Art Unit

2872

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 17 December 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-29 is/are pending in the application.
- 4a) Of the above claim(s) 25-29 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-24 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 02 December 2003 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☒ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
- 1) ☒ Certified copies of the priority documents have been received.
  - 2) ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - 3) ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 3/19/04 & 1/13/05.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

## DETAILED ACTION

### *Election/Restrictions*

1. Claims 25-29 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention, there being no allowable generic or linking claim. The election of Group I invention (claims 1-24) was made **without** traverse in the reply filed on 17 December 2004.

### *Oath/Declaration*

2. The oath or declaration is defective. A new oath or declaration in compliance with 37 CFR 1.67(a) identifying this application by application number and filing date is required. See MPEP §§ 602.01 and 602.02.

The oath or declaration is defective because:  
It does not identify the citizenship of each inventor.

### *Drawings*

3. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the peaks of the spectral reflectance curve for the S polarization, locally centered around the peaks, having a maximum level comprised between 80% and 100% as recited in claim 7; the integrated average transmittance between 400 and 700 nm being greater than 70%; a substrate comprising a stack of thin layers as recited in claim 19 and a substrate with a holographic element as recited in claim 20 must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended

replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

#### ***Claim Objections***

4. Claims 6-13 and 18 are objected to because of the following informalities:

Regarding claims 6 and 7, the phrase, "in which peaks of its spectral reflectance curve" lacks antecedent basis.

Regarding claims 8 and 9, the phrase, " in which its spectral reflectance curve" lacks antecedent basis.

Regarding claims 10 and 11, the phrase, "in which each peak of the spectral reflectance curve" lacks antecedent basis.

Regarding claims 12 and 13, the phrase, "in which each peak of the curve resulting from the product of the spectral transmittance for the P polarization and the spectral reflectance for the S polarization" lacks antecedent basis.

Regarding claim 18, the phrase "the integrated average transmittance" lacks antecedent basis.

For all of the antecedent basis issues above, the metes and bounds of the claim limitations are understood. Appropriate correction is required.

***Claim Rejections - 35 USC § 102***

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. Claims 1-7, 10, 11, 14-19, 21, 23 and 24 are rejected under 35 U.S.C. 102(b) as being anticipated by Aoki et al US 6,250,764.

In regard to claim 1, Aoki et al teaches (see for example, Figures 1B, 2, 4, 6, 7, 9 and 10) a polarization splitter (330) in which reflection of the S polarization is locally centered on at least one peak selected from the group consisting of (i) at least one emission peak of an image-emitting source of a micro-display, (ii) red, (iii) green and (iv) blue as shown in Figures 4, 6 and 7 and as described in column 5, lines 11-53, column 6, lines 45-62 and column 7, lines 29-39 and 56-62.

Regarding claim 2, Aoki et al teaches that the reflection is locally centered on at least two peaks as shown in Figures 4, 6 and 7.

Regarding claim 3, Aoki et al teaches that the reflection is locally centered on at least one peak in the visible spectrum as shown in Figures 4, 6, 7 and as described in column 6, lines 45-62 and column 7, lines 29-39 and 56-62.

Regarding claim 4, Aoki et al teaches that the reflection is locally centered on at least two peaks in the visible spectrum as shown in Figures 4, 6, 7 and as described in column 6, lines 45-62 and column 7, lines 29-39 and 56-62.

Regarding claim 5, Aoki et al teaches that the reflection for the S polarization is centered on red, green and blue as shown in Figures 4, 6, 7 and as described in column 6, lines 45-62 and column 7, lines 29-39 and 56-62.

Regarding claim 6, Aoki et al teaches that the peaks of its spectral reflectance curve for the S polarization, locally centered around the peaks, have their maximum level comprised between 60 and 100% as shown in Figures 4, 6, 7.

Regarding claim 7, Aoki et al teaches that the peaks of its spectral reflectance curve for the S polarization, locally centered around the peaks, have their maximum level comprised between 80 and 100% as shown in Figures 4, 6, 7.

Regarding claim 10, Aoki et al teaches that each peak of the spectral reflectance curve of the S polarization centered around one of the peaks has a mid-height width of between 5 and 100 nm as shown in Figures 4, 6, 7.

Regarding claim 11, Aoki et al teaches that each peak of the spectral reflectance curve of the S polarization centered around one of the peaks has a mid-height width of between 20 and 80 nm as shown in Figures 4, 6, 7.

Regarding claim 14, Aoki et al teaches that the spectral transmittance for the P polarization is greater than 80% on the emission spectrum of the source as shown in Figure 4.

Regarding claim 15, Aoki et al teaches that the emission spectrum of the source is between 400 and 700 nm as shown in Figure 4 and as described in column 6, lines 45-62.

Regarding claim 16, Aoki et al teaches that the spectral transmittance for the P polarization is greater than 90%, on the emission spectrum of the source as shown in Figure 4 and as described in column 6, lines 45-62.

Regarding claim 17, Aoki et al teaches that the emission spectrum of the source is between 400 and 700 nm as shown in Figure 4 and as described in column 6, lines 45-62.

Regarding claim 18, Aoki et al teaches the integrated average transmittance between 400 and 700 nm is greater than 70% as shown in Figure 4. Since the P polarized light transmittance is greater than 70% over the range shown in Figure 4, then the integrated average transmittance inherently will have a transmittance greater than 70%.

Regarding claim 19, Aoki et al teaches a substrate with a stack of thin layers as shown in Figure 2 and as described in column 5, lines 40-67.

Regarding claim 21, Aoki et al teaches that one of the materials is silicon dioxide as described in column 3, lines 10-17.

Regarding claim 23, Aoki et al teaches as shown in Figures 1A and 1B.

In regard to claim 24, Aoki et al teaches (see for example, Figures 1A, 1B, 2, 4, 6, 7) a method of manufacturing a polarization splitter (330) in which reflection of the S polarization is locally centered on at least one peak selected from the group consisting of (i) at least one emission peak of an image-emitting source of a micro-display, (ii) red, (iii) green and (iv) blue, comprising the following steps: (i) providing a substrate (321, 322); and (ii) depositing thin layers as shown in Figures 4, 6 and 7 and as described in column 8, lines 10-20.

7. Claims 1, 3, 5, 6, 7, 8, 9, 14-19, 21, 23 and 24 are rejected under 35 U.S.C. 102(b) as being anticipated by Sannohe et al US 5,453,859.

In regard to claim 1, Sannohe et al teaches (see Figures 1-3, 5, 6, 8, 10, 11) a polarization splitter (12, 13, 14) in which reflection of the S polarization is locally centered on at least one peak selected from the group consisting of (i) at least one emission peak of an image-emitting source of a micro-display, (ii) red, (iii) green and (iv) blue as shown in Figures 3 and 5 and as described in column 6, lines 40-57 and column 9, lines 34-45. It should be noted that while Figures 3 and 5 show transmittance %, the reflectance curve would be (1- transmittance %) or the reverse of the curve shown which would teach the emission peak claimed.

Regarding claim 3, Sannohe et al teaches that the reflection is locally centered on at least one peak in the visible spectrum as shown in Figures 3 and 5.

Regarding claim 5, Sannohe et al teaches that the reflection for the S polarization is centered on red, green and blue (approximately 630 nm, 520 nm and 460 nm, respectively) as shown in Figures 3 and 5.



Regarding claim 6, Sannohe et al teach that peaks of its spectral reflectance curve for the S polarization, locally centered around the peaks, have their maximum level comprised between 60 and 100% as shown in Figures 3 and 5.

Regarding claim 7, Sannohe et al teaches that peaks of its spectral reflectance curve for the S polarization, locally centered around the peaks, have their maximum level comprised between 80 and 100% as shown in Figures 3 and 5.

Regarding claim 8, Sannohe et al teaches that the spectral reflectance curve for the S polarization has a level comprised between 0 and 35%, in all zones not locally centered around the peaks as shown in Figures 3 and 5 (see areas before 420 nm and after 670 nm).

Regarding claim 9, Sannohe et al teaches that the spectral reflectance curve for the S polarization has a level comprised between 0 and 20%, in all zones not locally centered around the peaks as shown in Figures 3 and 5 (see areas before 420 nm and after 670 nm).

Regarding claim 14, Sannohe et al teaches that the spectral transmittance for the P polarization is greater than 80% on the emission spectrum of the source as shown in Figures 3 and 5.

Regarding claim 15, Sannohe et al teaches that the emission spectrum of the source is between 400 and 700 nm as shown in Figures 3 and 5.

Regarding claim 16, Sannohe et al teaches that the spectral transmittance for the P polarization is greater than 90%, on the emission spectrum of the source as shown in Figures 3 and 5.

Regarding claim 17, Sannohe et al teaches that the emission spectrum of the source is between 400 and 700 nm as shown in Figures 3 and 5.

Regarding claim 18, Sannohe et al teaches that the integrated average transmittance between 400 and 700 nm is greater than 70% as shown in Figures 3 and 5. Since the P polarized light transmittance is greater than 70% over the range shown in Figures 3 and 5, then the integrated average transmittance inherently will have a transmittance greater than 70%.

Regarding claim 19, Sannohe et al teaches a substrate with a stack of thin layers as shown in Figure 2 and as described in column 5, lines 45-67.

Regarding claim 21, Sannohe et al teaches that one of the materials is silicon dioxide as described in column 5, lines 45-67 and as shown in Table 1.

Regarding claim 23, Sannohe et al teaches that the polarization splitter is in the form of a cube made up of two prisms as shown in Figure 1 and as described in column 5, lines 21-44.

Regarding claim 24, Sannohe et al teaches a method of manufacturing a polarization splitter (12, 13, 14) in which reflection of the S polarization is locally centered on at least one peak selected from the group consisting of (i) at least one emission peak of an image-emitting source of a micro-display, (ii) red, (iii) green and (iv) blue, comprising the following steps: (i) providing a substrate (12); and (ii) depositing thin layers as shown in Figures 3 and 5 and as described in column 5, lines 45-67, column 6, lines 40-57 and column 9, lines 34-45. It should be noted that while Figures 3

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and 5 show transmittance %, the reflectance curve would be (1- transmittance %) or the reverse of the curve shown which would teach the emission peak claimed.

***Claim Rejections - 35 USC § 103***

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. Claims 12 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Aoki et al US 6,250,764.

Regarding claims 12 and 13, Aoki et al teaches the claimed invention except regarding claim 12 that for each peak of the curve resulting from the product of the spectral transmittance for the P polarization and the spectral reflectance for the S polarization, centered around one of the peaks, has a mid-height width of between 5 and 100 nm and regarding claim 13, that each peak of the curve resulting from the product of the spectral transmittance for the P polarization and the spectral reflectance for the S polarization, centered around one of the peaks, has a mid-height width of between 20 and 80 nm. It would have been obvious to one having ordinary skill in the art at the time the invention was made to have the peaks resulting from the products of the spectral transmittance for the P polarization and the spectral reflectance for the S polarization, centered around one of the peaks, to have the mid-height widths claimed since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the

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art. One would have been motivated to adjust the mid-heights widths of Aoki et al for the purpose of preventing crosstalk between the polarized states over the wavelength ranges. *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235

10. Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over Aoki et al US 6,250,764 in view of Joubert et al US 6,384,974.

Regarding claim 20, Aoki et al teaches the invention as set forth above but does not teach a substrate with a holographic element.

Regarding claim 20, Joubert et al teaches a substrate with a holographic element as described in column 2, lines 55-59.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to utilize the holographic element of Joubert et al in the polarization splitter of Aoki et al in order to provide for a splitter which can be produced a lower cost and with higher efficiency.

11. Claim 22 is rejected under 35 U.S.C. 103(a) as being unpatentable over Aoki et al US 6,250,764 in view of Sawamura US 6,859,315.

Regarding claim 22, Aoki et al teaches the invention as set forth above but does not teach that one of the materials is zirconium dioxide or praseodymium titanate.

Regarding claim 22, Sawamura teaches that one of the materials is zirconium dioxide as described in column 2, lines 41-44.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to utilize zirconium dioxide as taught by Sawamura for the

polarization beam splitter of Aoki et al in order to provide for small angle dependence and good polarization efficiency.

12. Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sannohe et al US 5,453,859 in view of Joubert et al US 6,384,974.

Regarding claim 20, Sannohe et al teaches the invention as set forth above but does not teach a substrate with a holographic element.

Regarding claim 20, Joubert et al teaches a substrate with a holographic element as described in column 2, lines 55-59.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to utilize the holographic element of Joubert et al in the polarization splitter of Sannohe et al in order to provide for a polarization splitter which can be produced at a lower cost and with higher efficiency.

13. Claim 22 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sannohe et al US 5,453,859 in view of Sawamura US 6,859,315.

Regarding claim 22, Sannohe et al teaches the invention as set forth above but does not teach that one of the materials is zirconium dioxide or praseodymium titanate.

Regarding claim 22, Sawamura teaches that one of the materials is zirconium dioxide as described in column 2, lines 41-44.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to utilize zirconium dioxide as taught by Sawamura for the polarization beam splitter of Sannohe et al in order to provide for small angle dependence and good polarization efficiency.

14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alessandro V. Amari whose telephone number is (571) 272-2306. The examiner can normally be reached on Monday-Friday 8:00 AM to 5:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Drew Dunn can be reached on (571) 272-2312. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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